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ABSTRACT

In science and social studies, teachers continue to present lessons that generally begin and end with the facts. Teaching students to comprehend is all but forgotten as teachers frequently attempt to cover as much content as possible, regard all content as equal, and divide content into artificial categories that bear little relationship to how individuals use content in the real world. This contradicts the fundamentally speculative nature of history and science, with thorough disregard for the element of story inherent in scientific discovery and history making. A study explored what would happen after children read nonfiction science literature and listened to factual stories. A second-grade teacher and class (n=27) participated in a science unit where the focus would not be on the facts, but on the individual and the personal connections the students would make between scientific facts and their own lives. The aim was to engage the students in a process of "seeing with significance." The study was based on two important theories: the reader response movement; and the Vygotskian notion that learning is more effective and proceeds further when it happens in a social context. It also explored whether the students would construct their new knowledge in the form of a narrative. Although it was not found that these students freely expressed their new learning automatically in a narrative form, considerable evidence was found to support the other two hypotheses. In informal small group conversations the students repeatedly connected new information to their personal experiences and benefited by open discussion during the learning process. When the learning environment was structured to permit an open type of imaginative connection building and collaboration, these second graders used that opportunity to enhance their learning. (Contains 21 references.) (NKA)

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EDUCATION BY IMAGINATION: USING NONFICTION CHILDREN'S LITERATURE TO PROMOTE AESTHETIC CONNECTIONS

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"Imagination is more important than knowledge."
(Einstein, 1995)

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Coming from a scientist, Einstein's belief in the supreme importance of human imagination presents a stark challenge to our tendency toward emphasizing knowledge in school. Traditionally, formal education at all levels has started with the teaching of basic vocabulary and facts before leading to the level of concepts. Similarly, language arts and reading have begun with isolated skill instruction, such as phonics and spelling, before the student is expected to write or read on the level of meaning. The mantra, "learn to read, read to learn", is usually the progression of learning in the elementary grades.

Although researchers such as Halliday (1975), looking at early childhood language development, and Goodman (1986), early reading and writing development, began to investigate reversing this order for literacy instruction, content area teaching remains largely unchanged.

In science and social studies teachers continue to present lessons that generally begin and end with the facts. Teaching students to comprehend is all but forgotten as teachers frequently attempt to cover as much content as possible, regard all content as equal, and divide content into artificial categories that bear little relationship to how individuals use content in the world beyond school (Fenimore & Tinzman, 1990). This unfortunate aspect of school instruction, i.e., covering content, persists, even though it contradicts the fundamentally speculative nature of history and science, with thorough disregard for the element of story inherent in scientific discovery and history making.

The purpose of this study was to explore what would happen after children read nonfiction science literature and listened to factual stories. Would these children naturally comprehend and reconstruct this new information into the form of a narrative? Would they retain or learn more if new learning was linked through analogy to their own experience? How would class discussions and collaborative work with others influence their retellings, writings and drawings?

Background

The various fields of science are rich in the lore of how chance, seemingly irrelevant or even mundane occurrences, in the life of a scientist has provided him or her with the flicker or insight, which leads to a scientific breakthrough. Although some accounts, such as the story of the apple falling from the tree onto Newton's head, are almost certainly myth, there are substantial number of similar, but true stories that have been documented in the diaries and biographies of great scientists. For example, one such account involves the Danish physicist, Neils Bohr, and his story of constructing the principle of complementarity in quantum theory (Bruner, 1983). Bohr tells of the day when he learned that his son had stolen a smoking pipe from a store and how irreconcilable this image of his son as thief was with the existing loving image Bohr had held. Grappling with these mutually exclusive, but simultaneously occurring perceptions of his son, helped Bohr to theoretically reconcile the concurrent facts of an atomic particle's velocity and its position.

While this story gives a fascinating glimpse into the thinking process of one seminal scientific mind, (even though it is likely typical, rather than exceptional to many great scientific discoveries), it is interesting because of the way in which Bohr's thought process mirrors the thinking of young children engaged in discovery learning. That is, rather than arriving at the understanding of a concept by following a predictable line of deductive reasoning built upon fact after fact, young students seem to follow erratic, unpredictable paths through both fact and fantasy on their way to discovery.

Traditionally, schools have created barriers for students who attempt to bring their experiences and the "facts" of the world into a focused, unified picture. This happens, because of educators' misconceptions about the true nature of learning "content", whether it is in science or in social studies. In disregard of Einstein's admonition, some educators have too often placed a premium of importance on often-literal knowledge of information, while disregarding the vital function of imagination in the learning process.

This approach to subject or content area teaching stands in contrast to the contemporary study of literature, which has recently undergone a broad revolution away from stressing the facts and correct interpretation of a poem or story towards and emphasis upon the reader's personal, imaginative experience with the text (Rosenblatt, 1978).

Rosenblatt characterizes these two different kinds of reading as efferent and aesthetic. In efferent reading, the reader's attention is focused on what is to be carried away. When readers assume an efferent stance, they focus attention

on the ideas and information they encounter in a text. Any personal physical, emotional reactions, or associations must be shut out, pushed into the fringes of awareness. Aesthetic reading, however, fuses the cognitive and affective elements of consciousness: sensations, images, feelings, ideas, into a personally lived through story. An aesthetic response to text is driven by personal feelings and attitudes that are stirred by the reader's transactions with the text (Rosenblatt, 1982).

Influenced by theorists such as Rosenblatt, many teachers are rethinking their approach to literature and comprehension instruction. Students are being encouraged to first explore their highly personal responses to a work of literature first, before analyzing stories for agreed upon universal themes. The importance of readers experiencing, or "living through" a work of literature is upheld by constructivists in educational psychology and by holistic teachers to be essential to the process of meaning making. This theory rests on the belief that true understanding only comes as a result of making connections and finding parallels between the work of literature and the life of the reader. Dorothy Heathecote refers to this process as "seeing with significance" (as cited in Wagner, 1976, p.191). Unfortunately, judging by observation on the lack of published accounts, this approach to literature instruction is rarely being extended to science or social studies teaching.

A typical statement reflecting this mentality comes from Loban (1988), who said, "Literature makes a direct claim on the emotions and imagination of the pupils. In science or social studies class, a body of information can be accurately

conveyed in a didactic manner – by lecture or demonstration." Loban goes on to say that, "in literature class, the focus should be on the relation between the student and the text" (1988). This same focus should be adhered to in science and social studies instruction.

The Study

A second grade teacher and class were recruited to participate in a science unit where the focus would not be on the facts, but on the individual and the personal connections which the students would make between scientific facts and their own lives. The purpose of the study was to explore what would happen after the children read nonfiction children's literature with a "science" theme and listened to factual stories. Simply put, I wanted to engage the students in a process of "seeing with significance." In other words, it was hoped that the students would go beyond the facts by beginning with their experiences and using their imaginations to connect new information as a means of discovering underlying concepts.

The study was based around two important theories: the reader response movement; a theory of learning as a process of personal construction of meaning (Rosenblatt, 1982), and on the Vygotskian notion that learning is more effective and proceeds further when it happens in a social context (Vygotsky, 1978).

Finally, I attempted to test the often-quoted claim that, "narrative is the primary act of mind transferred to art from life" (Hardy, 1978). I wanted to see if

the students would construct their new knowledge in the form of a narrative, even when students were engaged in nonfiction, expository science learning.

Method

This study took place in a second grade classroom in a metropolitan area of the Southwest United States. The 27 children in the class reflected backgrounds of Yaqui, and Hispanic cultures. A full time paraprofessional assisted the instructor in this classroom.

The following description is the result of a month long participant observation. During this time, recordings of retellings, written work, drawings and field notes were collected. A letter was sent home to parents explaining the connections between human, other animal life cycles, and their child's own birth. To begin the science unit about animal life cycles, the instructor unfolded a true story, the drama of the birth of his oldest son. After the initial story, students discussed what they knew, or had heard about the events of their own birthday, and brainstormed questions to ask parents, grandparents and other family members about that special day. Students were invited to draw pictures about the information of their birth from their personal interviews. They then brought their pictures and shared their stories in a whole group session.

Throughout the course of researching their own birth, the students were immersed in text sets of children's literature, such as Ben's Baby, (Foreman, 1987), Knots On a Counting Rope, (Martin & Archambault, 1987), and How You Were Born (Cole, 1984). The integration of both fiction and non-fiction helps

children experience two ways of knowing, and helps to make connections between the scientifically "knowable, and the unknowable" (Crook and Lehman, 1991). The rationale for using text sets is that "when readers read two or more texts that are related in some way, they are encouraged to share and extend their comprehension of each text differently than if only one text had been read and discussed" (Harste, Short, & Burke, 1996).

After much reading and sharing stories in small groups, students were again invited to retell their own birth story along with personal pictures, first toys or other meaningful artifacts they had brought from home in the large group. Later these artifacts became a bulletin board in the classroom that generated much interest and excitement. The concluding activity to this part of the unit was for the students to write their birth story. This led into a mini unit on animal birth and development. Students formed pairs and chose an animal (fish, bird, reptile or insect) to research and write stories.

Analysis and Discussion

According to Harold Rosen (1984), in every human being the drive to represent experience as narrative is indestructible. This experience can be composed of factual or fictional information. It makes no difference. "Given the least prompting, we are disposed to arrange around people and things a meaningful sequence of events" (1984, p.7). Bruner also adds to this claim by contending that humans organize new information into a narrative (1990).

The purpose of this study was threefold. Would students construct new science "content" knowledge in the form of a narrative? Would students use their own personal "experience" to construct knowledge in a social context?

Although I did not find that the second graders in this study freely expressed their new learning automatically in a narrative form, considerable evidence was found to support the other two hypotheses of learning as a process of personal construction of meaning (Rosenblatt, 1982), and that learning is more effective and proceeds further when it happens in a social context (Vygotsky, 1978). In informal small group conversations, it was found that the students repeatedly connected new information to their personal experiences and also benefited by open discussion with each other during the learning process. When the learning environment was structured to permit an open type of imaginative connection building and collaboration, these second graders used that opportunity to enhance their learning.

As the students browsed through both storybooks and information books, reactions, such as Vincent's were typical. "Hey, look at this mouse baby! I never looked like that, did I?" Vincent was viewing a photograph of a three-month-old mouse fetus. In each of the small groups, conversations relating to new information about human embryo development to the students' lives flourished in abundance. Furthermore, as students drew pictures and made notes, the tendency was to personalize the information by labeling the pregnant women as their own mothers and the fetuses as themselves or their youngest siblings.

Students were not learning about generic humans, they spontaneously inserted themselves into the picture.

The small group, informal, open-discussion format of the reading and note taking sessions led to frequent clarification exchanges such as between Angela and Monica. "Angela, you stay in your mom's stomach for nine months", said Monica. "No, you don't start in your mom's stomach, that's for food. You are lower. You are in her womb and the food comes down to you", said Angela. This collaborative learning process of combining what two or more people know as a way of extending what an individual knows, is referred to as scaffolding (Bruner, 1961), or learning through the zone of proximal development (Vygotsky, 1978).

In analyzing the students' taped retellings of their birth stories in the large group setting and the individual written stories of their birth, I saw little evidence of meaningful narrative construction. The students' tendencies, initially, were to relate a step-by-step factual retelling of their birth. There were few anecdotes, little drama and no "stories" even with adult prompting and questioning. Elaborations of these quasi-stories were kept at a minimum.

It was perceived this kind of storytelling was an uncomfortable activity for these students within the context of the classroom. However, outside formal school activities, students unveiled rich narratives about playground activities, and specific books they had shared. Somehow, it seemed, students had (over the course of three years in school) evolved a set of beliefs pertaining to what school assignments were about, and these beliefs did not include bringing their

own experiences into the class and telling stories. School to these children, meant filling out worksheets and doing factual book reports.

Why was this so? If sense of story is important to school activities, are there cultural differences in the narrative styles familiar to children at home which are not found when they come to school? Do these differences create discontinuities between school and home (Applebee, 1980)? This could definitely be one factor, but the more the data was analyzed, it suggested that the classroom environment played a major role in this reluctance to tell stories.

In classrooms where there are many opportunities to engage in the narrative mode of thought, literacy and literature becomes a dynamic entity. Children in such classrooms encounter and use narratives in a variety of ways: they tell and retell personal experiences, they create stories in play and social experiences, they read and listen to stories through literature, reading and writing, and they use and encounter narrative in texts where the narrative is used to explain an event, an idea, or some phenomena (van Dongen, 1987).

What happens in a classroom to support these kinds of narrative activities? A clue to this answer can be found in the teacher's beliefs about what is most important, what is basic. Those beliefs, in turn, affect the teaching approach and the learning environment (Zitlow, 1990). Some teachers almost seem to be driven to believe that reading and writing to learn facts are the most important aspects of schooling.

Perhaps, as Doyle (1983) suggests in his research on classroom environments, most work in schools take place in a highly "evaluative climate" in

which grades are exchanged for performance. As a result, accountability, in the form of answers and processes students are actually rewarded for, become the driving force behind how many students respond to school assignments. In other words, students tend to take seriously only the work, which they actually are held accountable for, as in this case, efferent decontextualized learning.

When the second graders in this study ordered their learning as a product in their retellings and written work, they tended to sift out personal associations and included only generic information. School had taught them to boil learning down to the facts, and only the facts.

Conclusions

Like Neils Bohr (1983), facing the seeming contradiction of an electron's massless existence, the study began facing the apparent contradiction between schools' tendency to treat content learning as an efferent process and students' opposing tendency to comprehend and learn through aesthetic interaction with ideas and information. As the study unfolded, through observing and discussing, a new law of complementarity began to evolve. Students seem to learn science best and retain their learning longest when they are encouraged to imaginatively connect the new learning with their prior knowledge and experiences. Instead of seeing learning as being either efferent, or aesthetic, as in Loban's (1963) model for science (efferent) versus literature (aesthetic) learning; the most complete and lasting efferent learning also has an aesthetic dimension built into it.

Heathcote once commented that, "The big thinkers never separate the information from the inspiration part of their thinking." She added the observation that scientists and engineers were much as artists and poets as they were drafts persons and mathematicians. "It is only in schools, she said, where these splits in our thinking occur" (Heathcoat, 1983). These second grade "little thinkers" also combined the inspiration and information as they learned in small informal group conversations, but when they presented their learning in large groups and in writing, only the mechanical drafting was evident at first. The poetry was missing.

If schools and teachers have created unintentional barriers for students who are attempting to understand the factual world through their own personal connections, how can this be changed? Broudy (1979) suggests that teachers restructure their classrooms and teaching to establish a climate that fosters aesthetic experience, provide guidance and time for contemplation and reflection, for returning again to the work, and encourage in children a willingness to explore. Instead of being an add-on, aesthetic response is believed by the teacher to be the "primary form of experience" on which all cognition, judgment, and action depend. It is the fundamental and distinctive power of image making by the imagination, and intelligence itself will be deflated.

Vacca & Vacca (2002) suggest one way to encourage thinking with content text is to take advantage of both efferent and aesthetic stances by having students actively respond on a daily basis to what they are reading by talking and writing. Spiegel (1999) suggests that teachers need to approach literacy and

content learning as a reflective process, or a balanced approach to learning. She defines a balanced approach to learning as:

> A balanced approach is a decision-making approach through which a teacher makes thoughtful decisions each day about the best way to help each child became a better reader and writer. A balanced approach requires and enables a teacher to reflect on what he or she is doing and to modify instruction daily based on the needs of each individual learner. The modifications are drawn from a broad repertoire of strategies and a sound understanding of children, learning, and the theoretical bases of these strategies (1999, p. 13).

At first blush, I contended that this lack of imagination and narration in student products resulted from their experiences in school. I believed that unlike my previous teaching experiences with young children, these second graders had internalized and accepted the school's definition of learning. Their retellings and writings had begun to resemble the impersonal, voiceless writing of their school textbooks. Even the oral accounts of their own birth read more like reports, rather than actual stories. At second blush, however, it wasn't only the lack of opportunity in the classroom to connect to personal experiences that contributed to the unimaginative retellings and writings. The topic itself that was chosen for the study could have greatly influenced students' retelling and written stories. The topic of birth, especially of one's own birth, may have been inhibiting and remote. The story of the students' births is intimate knowledge of parents, but not conscious knowledge of the students.

In conclusion, teachers need to reflect on their own classroom environment. Is it conducive to promoting collaboration and reflective thought in all academic areas? Do students have the opportunity to use personal experiences to connect to new knowledge? Promoting a positive learning

environment is the beginning step. Promoting connections by utilizing lived-through, actual remembered experiences is the second step.

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